CYTOLOGICAL STUDIES IN INDIAN PARASITIC PLANTS

II. The Cytology of *Loranthus*

BY L. S. S. KUMAR AND A. ABRAHAM
(*Botany Department, College of Agriculture, Poona*)

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IN a previous paper in this series (Kumar and Abraham, 1941 *a*), we described the cytology of *Striga*. The present paper briefly deals with the cytology of *Loranthus longiflorus*, Desr.

Loranthus species are hemi-parasites and the present material was collected locally from a mango tree. Due to the presence of large quantity of mucilage and tannin, proper fixation of the buds was difficult. The anthers in the immature condition are fused together by their margins to form a tube. Excellent smear preparations were obtained by dissecting out the anther tube and laying it with the inner side in contact with the slide and smearing with a scalpel, applying a little extra pressure, and immediately fixing in Nawaschin's fluid or in La Cour 2 BE. Staining was done by the usual iodine-gentian violet method.

Mitosis

The somatic chromosomes were studied from sections of the young ovule. There are eighteen chromosomes, two of which are satellited while the others have nearly median constriction (Fig. 1).

Meiosis

Meiosis was studied entirely from smear preparations. In smears stained with acetocarmine the spiral structure of chromosomes was evident from leptotene stage onwards. But as the chromosomes are not large enough it was not possible to critically follow all the details of structure.

At diplotene nine bivalents are clearly seen. The nucleolus persists up to this stage, though only faintly stained, and one of the bivalents is usually attached to it.

The chiasma frequency at diplotene is very low and most of the bivalents are held together by a single chiasma. In acetocarmine preparations it was seen that in such cases the major spirals of the chromosomes are free

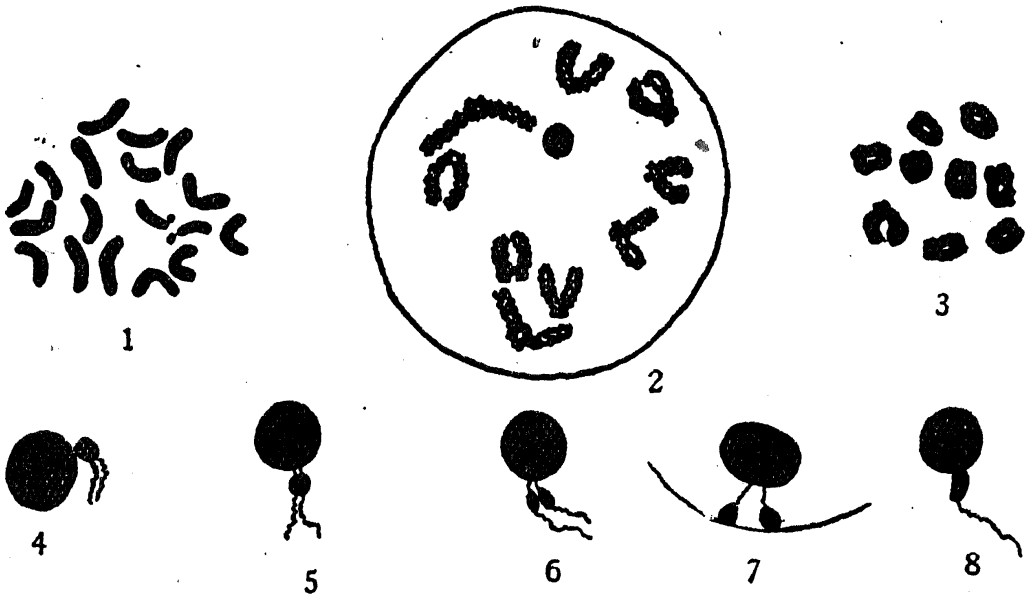
from each other, suggesting that the mechanism of spiralisation is of the "balanced type" (Abraham, 1939) or "anorthospiral" (Kuwada and Nakamura, 1940).

Though the free arms of the bivalents are seen diverging from each other at the diplotene stage (Fig. 2), by diakinesis they come together again and at metaphase (Fig. 3) they are seen close together. It is not possible to say whether this is a fixation effect or not; but it is significant that it was observed in a number of cases both in permanent smears as well as in temporary acetocarmine preparations.

The second division is normal and nine chromosomes were counted at both metaphase plates in the same mother cell.

Nucleolus

There are two nucleolar chromosomes seen in the somatic complement and at diplotene one bivalent is seen attached to the nucleolus. An interesting feature seen from leptotene to pachytene is the presence of what appears like nucleolar buds. As the chromosome threads are very fine and very distinctly stained, it was possible to study the relationship of these bodies to the chromosomes. In Fig. 4, a nucleolar bud is seen in contact with the nucleolus and two leptotene chromosomes attached to it. In Fig. 5 the nucleolar bud is connected to the nucleolus by two very fine



TEXT-FIGS. 1-8

Fig. 1. Somatic chromosomes from cell of ovule ($2n=18$). Note two satellited chromosomes. Fig. 2. Diplotene, showing nine bivalents, seven of which possess only one chiasma each. Fig. 3. Metaphase showing nine bivalents. Figs. 4–8. Nucleolus and knob-like structure on nucleolar chromosomes (*vide* text). All figures are camera lucida drawings made from permanent preparations. Magnification of Fig. 1 is ×3,000, while all the other figures are ×2,000.

threads, which may be the continuation of the chromonemata. In deeply stained preparations the small nucleolar bud is always seen in contact with the nucleolus, probably due to the masking of the gap due to retention of stain, as in Fig. 8. In Figs. 6 and 7, there are two nucleolar buds each attached to a chromosome. These clearly indicate that what has been called a ' nucleolar bud ' for the sake of convenience of description may not actually be the result of budding of the nucleolus, but may be only an accumulation of nucleolar matter at the constriction between the satellite and the main body of the nucleolar chromosome. Whether this is really so or only a knob of the type seen in *Euchlæna* chromosomes (Longley, 1937) could not be determined. In *Sesamum orientale*, we found a secondary nucleolus originating from the primary nucleolus and persisting throughout both divisions of meiosis and ultimately getting enclosed in one or other of the four daughter cells (Kumar and Abraham, 1941 *b*). But the knob-like structures seen in the present case are most clearly visible from leptotene to pachytene and later they disappear, even before the main nucleolus disappears. The origin of nucleoli and their possible role in nuclear and cell division have been discussed in detail elsewhere (Kumar and Abraham, 1941 *c*).

Summary

The cytology of *Loranthus longiflorus* is briefly described. There are eighteen chromosomes in somatic cells and two of these are satellited. Nine bivalents were seen at the first meiotic division. The presence of a knob-like swelling on the nucleolar chromosomes near their attachment to the nucleolus is seen from leptotene to zygotene.

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